

**Citation:**

Hancox RJ, Milne BJ, Poulton R. Association between child and adolescent television viewing and adult health: a longitudinal birth cohort study. *Lancet*. 2004 Jul 17-23;364(9430):257-62.

**PubMed ID:** [15262103](#)

**Study Design:**

Longitudinal Cohort Study

**Class:**

B - [Click here](#) for explanation of classification scheme.

**Research Design and Implementation Rating:**

POSITIVE: See Research Design and Implementation Criteria Checklist below.

**Research Purpose:**

The association between child and adolescent television viewing and a range of adult health indicators was examined in a birth cohort of approximately 1000 New Zealanders.

**Inclusion Criteria:**

Born in Dunedin, Otago province, New Zealand, between April 1972 and March 1973. All children who still resided in Otago at 3 years of age were invited to participate.

**Exclusion Criteria:**

No exclusion criteria defined.

**Description of Study Protocol:**

**Recruitment:** Recruitment process was not defined. All children still living in Otago at 3 years of age was invited to participate. A written informed consent was obtained for each assessment.

**Design:** Longitudinal cohort study

**Blinding used:** N/A

**Intervention:** N/A

**Statistical Analysis:**

- Linear regression - to examine the association between television viewing and health indicators (BMI, cardiorespiratory fitness, serum cholesterol and systemic blood pressure) at age 26 years
- Logistic regression - to examine the relation between television viewing and current

smoking.

### Data Collection Summary:

**Timing of Measurements:** Information was obtained on television viewing at ages 5, 7, 9, 11, 13, 15 and 21 years of age. Between ages 5 and 11 years, parents were asked how much time study participants spent watching television weekly. At ages 13, 15 and 21 years, study participants were asked themselves how long they usually watched television on weekdays and weekends. Associations between television watching in two developmental epochs was analyzed; childhood (5-11 years) and adolescence (13-15 years). At age 26, participants were studied to assess adult health. The following measurements were obtained; BMI, blood pressure,  $\text{VO}_2\text{max}$ , non-fasting blood samples and current cigarette smoking status. Socioeconomic status was determined according to members' families highest educational level and income associated with occupation.

### Dependent Variables

- BMI, cardiorespiratory fitness, serum cholesterol, smoking status and blood pressure

### Independent Variables

- Television viewing

### Control Variables

- Ethnicity, sex and bodyweight

### Description of Actual Data Sample:

**Initial N:** 1037 children (535 boys and 502 girls)

**Attrition (final N):** 980 adults (no breakdown available for men/women)

**Age:** All participants were 3 years old at first assessment and 26 years old upon the final assessment

**Ethnicity:** New Zealanders from the Otago province

**Other relevant demographics:** Not noted

### Anthropometrics:

- BMI for children and adolescents (age 5-15) based on  $\beta \pm \text{SE}$ 
  - Unadjusted (n=929) =  $0.54 \pm 0.17$
  - Adjusted (n=709) =  $0.48 \pm 0.19$
- BMI for developmental epochs
  - Childhood (age 5-11 years) (n=924) =  $0.49 \pm 0.18$
  - Adolescence (age 13-15 years) (n=817) =  $0.33 \pm 0.10$
  - Early adulthood (age 21 years) (n=0.23 $\pm$ 0.09)

**Location:** Dunedin, Otago province, New Zealand

## Summary of Results:

### Key Findings:

- Child and adolescent viewing (age 5-15 years) correlated with lower childhood socioeconomic status ( $n=1013$ ,  $r=0.31$ ,  $p<0.0001$ ), increased parental smoking ( $n=998$ ,  $r=0.11$ ,  $p=0.0005$ ), higher maternal and paternal BMI ( $n=839$ ,  $r=0.09$ ,  $p=0.0086$ ;  $n=789$ ,  $r=0.11$ ,  $p=0.013$ , respectively) and higher BMI at age 5 ( $n=996$ ,  $r=0.11$ ,  $p=0.004$ )
- Physical activity at 15 years of age did not correlated with overall child and adolescent viewing, but was significantly correlated with fewer hours of adolescent viewing ( $n=825$ ,  $r=-0.09$ ,  $p=0.0101$ )
- Childhood and adolescent (age 5-15 years) television viewing predicted a higher BMI, lower VO<sub>2</sub>max, higher serum cholesterol and increased cigarette smoking at age 26
- No significant association between television viewing and blood pressure was noted
- Similar patterns of results were seen for childhood (age 5-11 years), adolescent (age 13-15 years) and early adulthood (21 years)
- Distributions of the residuals from the linear regression analyses of BMI, VO<sub>2</sub>max and serum cholesterol were slightly skewed. Repeated analyses after log-transformation of these variables corrected this problem and provided similar results to those of untransformed variables; in (BMI)  $\beta$  coefficient (SE)= $0.02\pm0.006$ ,  $p=0.0004$ ; in (VO<sub>2</sub>max)= $-0.03\pm0.009$ ,  $p=0.0003$ ; in (cholesterol)= $0.02\pm0.008$ ,  $p=0.0052$
- Television viewing between ages 5 and 15 years remained a significant predictor of adult BMI, VO<sub>2</sub>max, cholesterol and smoking after adjustment for childhood socioeconomic status
- Child and adolescent television viewing remained a significant predictor of adult BMI after additional adjustment for BMI at age 5 years and the estimated BMI of both parents
- In analyses adjusting for viewing at age 21 years, child and adolescent television viewing remained a significant predictor of higher BMI ( $p=0.0394$ ), reduced VO<sub>2</sub>max ( $p=0.0060$ ) and cigarette smoking ( $p=0.0243$ ) at age 26 years
- Six hundred twenty-two (61%) study members watched television for an average of more than 2 hours/weekday between ages 5 and 15 years
- Population-attributable fractions calculated on unadjusted results indicate that 17% (95% CI 7-25) of overweight, 15% (-2 to 29) of poor cardiorespiratory fitness, 15% (0-27) of raised cholesterol and 17% (7-26) of current smoking in 26 year olds could be attributed to exceed this limit.

### Author Conclusion:

- The results show that television viewing during childhood and adolescence is associated with overweight, poor cardiorespiratory fitness, raised serum cholesterol and cigarette smoking in early adulthood
- There was no significant association between television viewing and blood pressure
- The data on television viewing were collected prospectively throughout childhood and adolescence and socioeconomic status was controlled for at the same time
- Study members with an early tendency to be overweight at the beginning of the television viewing period using age-5 BMI values and a familial tendency to overweight using parental values was controlled for
- Watching television might also influence other behaviors, such as cigarette smoking, which was found to be significantly associated with television viewing

- Children and adolescents who watched one hour or less a day were the healthiest, although not many were in this group (30 [5.7%] male study members, 39 [7.9%] female study members)
- If a causal association between child and adolescent television viewing and adult health, calculations of population-attributable fractions indicate that exceeding the 2 hour limit might be responsible for 17% of overweight, 15% of poor fitness, 15% of raised serum cholesterol and 17% of smoking at age 26 years.

### Reviewer Comments:

- *There is no way to assess the accuracy of the self-reported television viewing*
- *Weekend television viewing was not asked about between age 5 and 11 years*
- *Under- and overreporting may be possible for self-reporting of television viewing*
- *A causal association cannot be determined*
- *Television advertising in New Zealand tends to promote an unhealthy diet; sufficient information on diets of study members was not available to explore the possibility that dietary practices might mediate the association between viewing and health*
- *Watching television might also influence other behaviors, such as cigarette smoking, which was found to be significantly associated with television viewing.*

### Research Design and Implementation Criteria Checklist: Primary Research

#### Relevance Questions

- |    |   |     |
|----|---|-----|
| 1. | Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies) | Yes |
| 2. | Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?   | Yes |
| 3. | Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?  | Yes |
| 4. | Is the intervention or procedure feasible? (NA for some epidemiological studies)  | Yes |

#### Validity Questions

- |      |   |     |
|------|---|-----|
| 1.   | <b>Was the research question clearly stated?</b>  | Yes |
| 1.1. | Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified? | Yes |
| 1.2. | Was (were) the outcome(s) [dependent variable(s)] clearly indicated?                          | Yes |
| 1.3. | Were the target population and setting specified?   | Yes |

<b>2.</b>	<b>Was the selection of study subjects/patients free from bias?</b>	Yes
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes
2.2.	Were criteria applied equally to all study groups?	Yes
2.3.	Were health, demographics, and other characteristics of subjects described?	Yes
2.4.	Were the subjects/patients a representative sample of the relevant population?	Yes
<b>3.</b>	<b>Were study groups comparable?</b>	Yes
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	N/A
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	N/A
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	N/A
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	Yes
3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	Yes
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
<b>4.</b>	<b>Was method of handling withdrawals described?</b>	Yes
4.1.	Were follow-up methods described and the same for all groups?	Yes
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	Yes
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	Yes
4.4.	Were reasons for withdrawals similar across groups?	???
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
<b>5.</b>	<b>Was blinding used to prevent introduction of bias?</b>	Yes

5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	N/A
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	Yes
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
<b>6.</b>	<b>Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were intervening factors described?</b>	<b>Yes</b>
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	Yes
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	Yes
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	N/A
6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	N/A
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
<b>7.</b>	<b>Were outcomes clearly defined and the measurements valid and reliable?</b>	<b>Yes</b>
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	Yes
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	Yes
7.5.	Was the measurement of effect at an appropriate level of precision?	Yes
7.6.	Were other factors accounted for (measured) that could affect outcomes?	Yes

7.7.	Were the measurements conducted consistently across groups?	Yes
<b>8.</b>	<b>Was the statistical analysis appropriate for the study design and type of outcome indicators?</b>	Yes
8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	No
8.6.	Was clinical significance as well as statistical significance reported?	Yes
8.7.	If negative findings, was a power calculation reported to address type 2 error?	N/A
<b>9.</b>	<b>Are conclusions supported by results with biases and limitations taken into consideration?</b>	Yes
9.1.	Is there a discussion of findings?	Yes
9.2.	Are biases and study limitations identified and discussed?	Yes
<b>10.</b>	<b>Is bias due to study's funding or sponsorship unlikely?</b>	Yes
10.1.	Were sources of funding and investigators' affiliations described?	Yes
10.2.	Was the study free from apparent conflict of interest?	Yes

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